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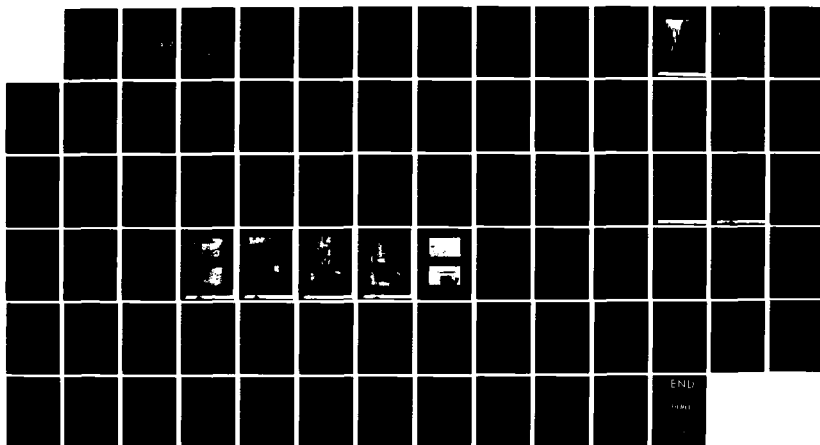
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
SEABRIGHT POND DAM (M. (U) CORPS OF ENGINEERS WALTHAM
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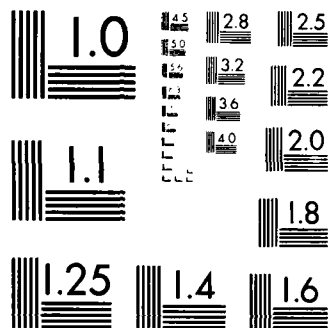
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MEGUNTICOOK RIVER BASIN
CAMDEN, MAINE

SEABRIGHT POND DAM
ME 00277

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST 1978

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is a gravity dam constructed of stone masonry and concrete. It is 23 ft. high and has an overall length of 400 ft. The dam is judged to be in poor condition. There are areas of serious concern which must be corrected to improve the long-term safety of the dam. It is small in size with a high hazard classification.		

SEABRIGHT POND DAM

ME-00277

MEGUNTICOOK RIVER BASIN

CAMDEN, MAINE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

ME-00277

SEABRIGHT POND DAM

KNOX COUNTY, MAINE

MEGUNTICOOK RIVER

July 18, 1978

BRIEF ASSESSMENT

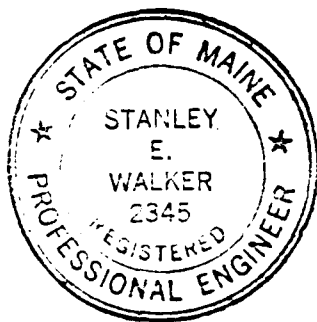
The Seabright Pond Dam is a gravity dam constructed of stone masonry and concrete. It has earth embankment and concrete wing walls. The dam is 23 feet high and its overall length is nearly 400 feet.

Based on the visual inspection and reported past operational performance, the Seabright Pond Dam is judged to be in poor condition. There are areas of serious concern which must be corrected to improve the long-term safety of the dam.

Based on its small size and high hazard classification in accordance with the Corps of Engineers' guidelines, the test flood falls between 1/2 and 1 times the maximum probable flood (MPF). The dam will not pass a flow greater than approximately a 10-year flood without overtopping. The spillway will carry approximately 2.4 percent of the maximum probable flood and therefore the spillway capacity is seriously inadequate.

Maintenance actions and major repairs as outlined in Section 7 should be made to the Seabright Pond Dam within 12 months after receipt of this report by the owner. The principal items to be investigated and corrected are: 1) repairs to the lip of the concrete spillway, 2) a fill or other suitable system to support the retaining wall in the west embankment and 3) a reinforced concrete downstream

face below the spillway to prevent dislodgment of the presently loose stone masonry. A definite plan for around the clock surveillance should be implemented for periods of unusually heavy rain or anticipated runoff and a formal warning system should be developed for use should an emergency develop.



EDWARD C. JORDAN CO., INC.

A handwritten signature of Stanley E. Walker in cursive script, written over a horizontal line.

Stanley E. Walker, P.E.
Project Manager

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway test flood is based on the estimated "Maximum Probable Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

TABLE OF CONTENTS

	<u>PAGE</u>
LETTER OF TRANSMITTAL	
BRIEF ASSESSMENT.....	i
REVIEW BOARD SIGNATURE SHEET.....	iii
PREFACE.....	iv
TABLE OF CONTENTS.....	v
OVERVIEW PHOTOGRAPH.....	vii
LOCATION MAP.....	viii

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL.....	1
1.2 DESCRIPTION OF PROJECT.....	1
1.3 PERTINENT DATA.....	3

SECTION 2 - PROJECT INFORMATION

2.1 DESIGN.....	7
2.2 CONSTRUCTION.....	7
2.3 OPERATION.....	7
2.4 EVALUATION.....	7

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS.....	8
3.2 EVALUATION.....	10

TABLE OF CONTENTS (continued)

SECTION 4 - OPERATING PROCEDURES

4.1	PROCEDURES.....	11
4.2	MAINTENANCE OF DAMS.....	11
4.3	MAINTENANCE OF OPERATING FACILITIES.....	11
4.4	DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT.....	11
4.5	EVALUATION.....	11

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1	EVALUATION OF FEATURES.....	12
-----	-----------------------------	----

SECTION 6 - STRUCTURAL STABILITY

6.1	EVALUATION OF STRUCTURAL STABILITY.....	14
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SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

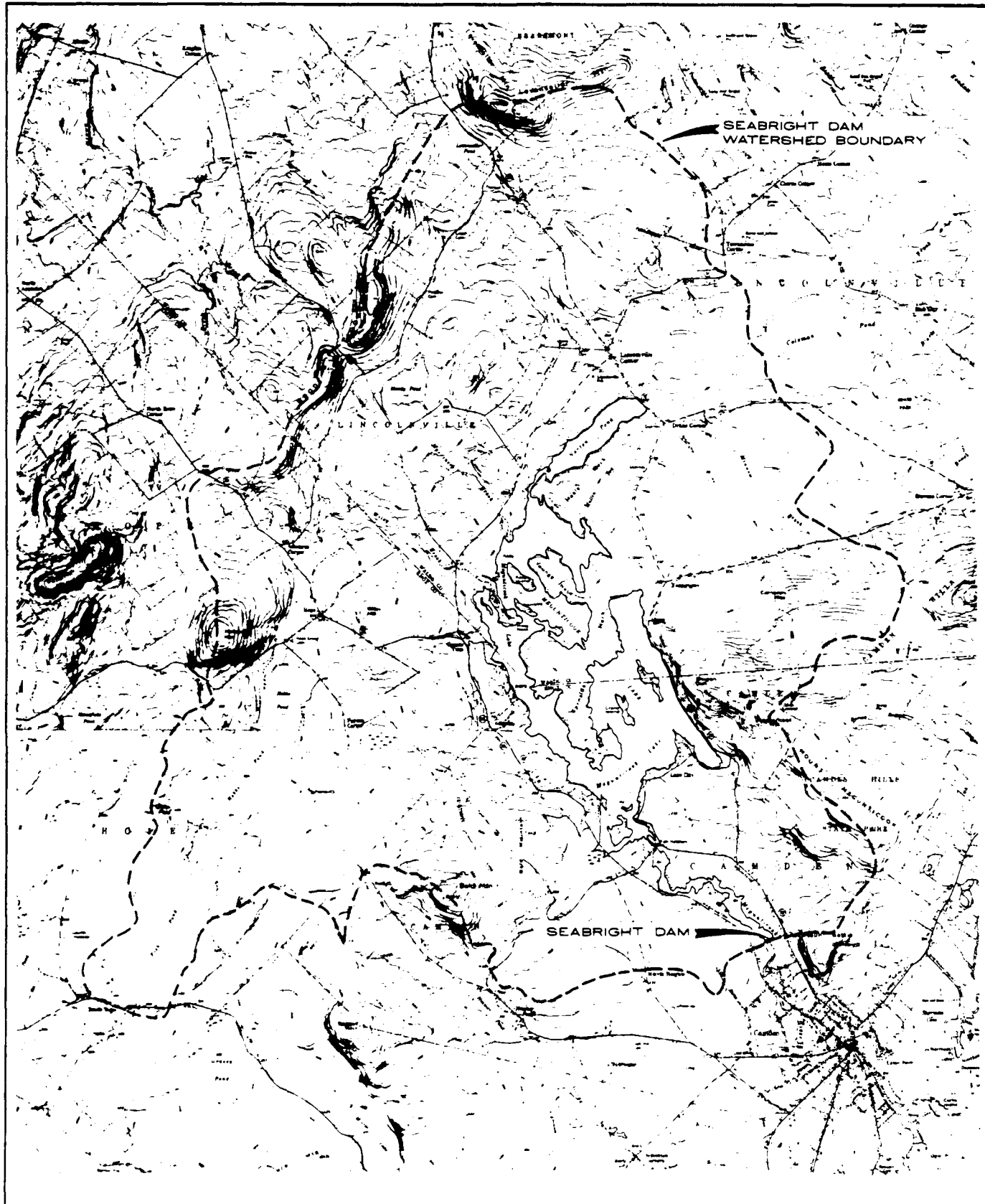
7.1	DAM ASSESSMENT.....	15
7.2	RECOMMENDATIONS.....	16
7.3	REMEDIAL MEASURES.....	17

APPENDICES

A	FIELD INSPECTION NOTES
B	ENGINEERING DATA
C	PHOTOGRAPHS
D	HYDROLOGIC AND HYDRAULIC COMPUTATIONS
E	INVENTORY FORMS



OVERVIEW



0 2 MILES



ADVISOR	DESIGNER	APPROVED FOR CONSTRUCTION
PROJECT NAME	DATE	BY
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS		
SEABRIGHT DAM		
LOCATION MAP		
MEGUNTICOOK RIVER		MAINE
SCALE AS SHOWN		
DATE AUGUST 1978		

PHASE I INSPECTION REPORT
SEABRIGHT POND DAM
SECTION 1
PROJECT INFORMATION

1.1 GENERAL

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Edward C. Jordan Co., Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Maine. Authorization and notice to proceed were issued to Edward C. Jordan Co., Inc. under a letter of June 20, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0349 has been assigned by the Corps of Engineers for this work.

b. Purpose

- (1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
- (2) To encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.
- (3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF PROJECT

a. Location. The Seabright Dam is located on the Megunticook River about 1-1/4 miles northwest of the built-up portion of the town of Camden, Maine. N 49°-13' W 69°-5'

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

- a. Condition. The visual inspection and compilation of available engineering data indicate that the Seabright Dam is in poor condition. The spillway capacity of the dam is about equal to a 10-year flood flow. The stability of the structure is assessed to be fair under this condition. The maximum probable flood (MPF) peak flow at the Seabright Dam has been calculated to be approximately 43,500 cfs. Due to the effect of surcharge storage, the Seabright Dam has to pass a reduced peak flow of about 42,100 cfs. The Seabright Dam would be overtopped by about 12.5 feet. With a spillway capacity of approximately 1,000 cfs, the Seabright Dam can pass about 2.4% of the adjusted MPF flow.

Major concerns regarding the Seabright Dam are: (1) the looseness of the stone masonry which makes up the spillway portion of the dam, (2) the inadequacy of the spillway to pass more than a 10-year flood without overtopping the embankment portions of the dam, and (3) the condition of the stone retaining wall at the west embankment. Under high flows, the potential for further loosening and loss of stones from the downstream face of the spillway section appears likely. Overtopping of the earth embankment sections of the dam would subject these sections to erosion and subsequent failure under high flows. The wall retaining the west embankment has deflected substantially, and continued movement of this wall due to frost action or other forces will result in failure of the wall. Loss of this wall jeopardizes the stability of the west embankment section.

- b. Adequacy of Information. The information available is such that the assessment of the condition of the dam must be based primarily on the visual inspection

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations. Based on visual observations, the dam appears stable under low flow conditions but it exhibits signs of deterioration which could seriously effect its stability under high flow conditions. The downstream masonry face of the dam is loose, the spillway crest is badly cracked and other concrete members of the structure are badly cracked or spalled.
- b. Design and Construction Data. No data regarding original design or construction is available for Seabright Dam.
- c. Operating Records. None available.
- d. Post Construction Changes. The concrete lip of the spillway is tipped downstream and cracked in many locations. The mortar-laid stone masonry downstream face of the dam has a bulged appearance and the mortar is badly deteriorated and stones are loose. The stone masonry retaining wall downstream of the west embankment has deflected downstream at least 12 inches at the top.

Since original construction, the dam has been modified for hydro-electric power generation which has since been removed. The spillway was repaired about 1963. A concrete bulkhead was placed in the headworks of the generator room and a new spillway gate was installed in 1975.

- e. Seizmic Stability. The dam is located in Seismic Zone No. 1 and in accordance with recommended Phase I guidelines does not warrant seismic analysis.

described in an attachment to ETL 1100-2-234. The failure analysis assumes a breaching of the dam at full spillway capacity. The wave height just downstream of the Seabright Dam would be about 21.0 feet. At the Mt. Battie Road Bridge about 1300 feet downstream of the dam the wave height would be 13.9 feet, and the wave height at the Washington Street Bridge about 3700 feet downstream of the dam would be about 21.2 feet. In the event of failure of the Seabright Dam, approximately 10 seasonal and year-round dwellings located within 1/2 mile of the dam would be damaged. Thus the Seabright Dam is classified as having a high hazard potential.

The drainage area at Seabright Pond is about 34 square miles and the reservoir area is about 100 acres. Inflows to Seabright Pond are highly dependent on the regulated or spillage outflows from Megunticook Lake, a large upstream reservoir within the watershed. A detailed hydrologic analysis of Seabright Pond could not be performed without including the analysis of this other project. The possible effects of this reservoir were not considered in this cursory study of Seabright Pond.

Since Seabright Dam is classified as having a high hazard potential, the dam must be analyzed for passing the maximum probable flood. The maximum probable flood (MPF) has been calculated to be 43,500 cfs, according to the Army Corps of Engineers, "Preliminary Guidance for Estimating Maximum Probable Flood Flows." Consideration of the effect of surcharge storage (according to "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations," March 1978, New England Division, Corps of Engineers) reduces the outflow MPF to 42,100 cfs. The MPF would overtop the dam by about 14 feet (or about 17.5 feet on the emergency spillway). The spillway capacity of the dam is about 1000 cfs, which is 2.4% of MPF. By considering a 1 foot higher pool, the capacity reaches about 1560 cfs. At this higher pool the generator room is overtopped by 1 foot, but the earth embankments are not overtopped.

SECTION 5
HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

- a. Design Data. Design data was not available for the Seabright Dam.
- b. Experience Data. Published hydrologic data for the Megunticook River Basin appears to be entirely lacking. It is estimated that the 10-year and 100-year flood discharges at Seabright Dam are about 1330 cfs and 3960 cfs, respectively. These flows were calculated by performing a log-Pearson Type III statistical analysis of a similar USGS gaged watershed, (Kettle Brook Gage No. 01109500 at Worcester, Mass., Drainage Area = 31.3 square miles).

A review of lake level data for Megunticook Lake would indicate that the 10-year flood flow was likely equalled or exceeded four times in the last 50 years: in April, 1940; in December, 1969; in December, 1973; and in December, 1977.

- c. Visual Inspection. The outlet of Seabright Pond is controlled by the Seabright Dam, which is a mortar-laid rubble stone masonry and concrete dam and earth embankment extending about 450 feet across the flood plain. The downstream channel is quite rocky and steep (1 percent slope), and the overbanks are cluttered with debris, trees, and bushes. There was inadequate data to perform a tailwater analysis, but it is estimated that the 100-year frequency flooding event would not submerge the dam. The regulated outlet was reported to be operational within the year preceding the inspection. It was not operated during the inspection, however, because closure reportedly requires draining the pond.
- d. Overtopping Potential. The hazard potential was determined by analyzing downstream dam failure hydrographs according to rule of thumb methods as

SECTION 4

OPERATING PROCEDURES

4.1 PROCEDURES

The gates are operated at the Seabright Dam only to facilitate maintenance since the owner of the dam presently makes no use of the stored water. At the time of inspection (July 17, 1978), the spillway gate was open and the reservoir level was at approximate Elevation 123 or about 1.6 feet below the emergency spillway crest. The water level was being maintained low by the owner due to his concern for the stability of the retaining wall in the west embankment. There are 0.5 foot long iron rods cast into the crest of the lip of the Seabright Dam spillway which would allow the installation of flashboards, however, flashboards are not used. The gates at the Seabright Dam are secured with chains and padlocked between operations.

4.2 MAINTENANCE OF DAM

No record of maintenance was available for the Seabright Dam. A repair was made (no details available) to the spillway apron about 1963. Recently, about 1975, a 12-inch thick reinforced concrete bulkhead was placed in the upstream inside wall of the generator room.

4.3 MAINTENANCE OF OPERATING FACILITIES

The gate stem for the spillway gate has been recently repaired by splicing. The stem was reportedly cut by vandals and has since been repaired. The timber spillway gate was reportedly replaced about 1963. No other recent maintenance was reported or observed.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

None in effect.

4.5 EVALUATION

No regular operation or maintenance program is apparently in effect at the Seabright Dam. Repairs have been undertaken in the past on an as-needed basis. No warning system for either high water or structural distress is in effect at this dam.

The timber service bridge is in generally good condition, however, the support beams are rotted at the east end. See photograph 1.

The support beams for the regulated outlet are badly rotted. See photographs 1 and 7.

A diving board has been attached to the service bridge and a ladder has been attached to the regulated outlet gate works.

d. Reservoir Area. The outlet from Seabright Pond is controlled by the Seabright Dam, which is a mortar-laid rubble stone masonry and concrete dam and earth embankment extending about 450 feet across the flood plain. The approach channel is formed by the pond and is unrestricted. See photograph 6.

e. Downstream Channel. As shown in photograph 10 the downstream channel is slightly constricted about 40 feet downstream of the dam by a concrete slab situated about 7 feet over the river. The river channel is quite rocky, but the gradient is relatively steep (1 percent). The overbanks in the immediate area of the dam are cluttered with debris from the remains of a factory. Further downstream the overbanks have a heavy growth of trees and bushes with some trees over-hanging the channel.

3.2 EVALUATION

Based on the visual inspection, the dam appears to lack appropriate maintenance and to contain several cracked or otherwise deteriorated elements. The stone masonry portion of the dam and retaining wall in the west embankment are in poor condition. The timber supports for the service bridge and gateworks are rotted. The concrete lip in the spillway crest is badly damaged and other areas of the concrete members of the structure are badly cracked or spalled.

- (d) Substantial seepage is occurring through the spillway portion of the dam. See photograph 2.
 - (e) The west concrete support for the spillway gate is cracked. See photograph 5.
 - (f) Apparently some minor erosion of the west embankment has occurred at its junction with the generator room section of the dam.
- (2) Hydraulics - At the time of the visual inspection the pond level was about 1.6 feet below the emergency spillway elevation. The only discharge was from the gated spillway, which was found to be operational.

The regulated outlet gate was closed. It was reported to be operational, at least within the year preceding this inspection. However, it was not operated at the time of the inspection because reportedly closure is only possible after the pond has been drained.

c. Appurtenant Structures. A 17 x 12 foot generator room exists at the west end of the spillway. This room is within a reinforced concrete portion of the dam, see X-sections in Appendix B-1. The interior faces of three walls and the exterior face of the downstream wall are badly spalled. A new 12-inch thick concrete bulkhead has been placed on the inside upstream wall.

The spillway gate works consist of a vertical timber lift gate operated manually by a rack and gear. The works are in good mechanical condition. The gate stem has been spliced (apparently adequately) repairing vandalism to the gate works. See photograph 5.

The regulated outlet gate works consist of a vertical lift gate manually operated by a vertical screw. The raising mechanism is in good mechanical order, however, the timber support beams are badly rotted prohibiting proper operation of the gate. See photograph 7.

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General. The Seabright Dam is located in a broad section of the Megunticook River valley. The dam appears to be founded in the glacial marine and glacial till soils overlying bedrock. Although the embankments and concrete structures appear to be in reasonably good condition, the stone masonry portion of the structure is in poor condition.

b. Dam.

- (1) Structural - The Seabright Dam is constructed of mortar-laid rubble stone masonry and concrete; see plan, profile, and X-sections (Appendix B-1). The structure appears to lack the benefit of routine maintenance and the stone masonry portion of the dam is in poor condition. See Appendix A for detail inspection findings.

The visual inspection resulted in the following major findings:

- (a) The mortar laid stone masonry portion of the dam is in poor condition. Many stones are loose and some are missing. The mortar is badly deteriorated and missing in many joints. The surface has a bulged appearance. See photographs 1 and 2.
- (b) The concrete lip of the spillway is tipped downstream and has cracked in many locations. See photographs 2 and 5.
- (c) The stone masonry retaining wall downstream of the west embankment has tipped downstream as much as 12 inches. See photograph 9.

SECTION 2

ENGINEERING DATA

2.1 DESIGN

Not available.

2.2 CONSTRUCTION

Not available.

2.3 OPERATION

The gates are operated at the Seabright Dam only to facilitate maintenance since the owner of the dam presently makes no use of the stored water. At the time of inspection (July 17, 1978), the spillway gate was open and the reservoir level was at approximate Elevation 123 or about 1.6 feet below the spillway crest. The water level was being maintained low by the owner due to his concern for the stability of the retaining wall in the west embankment. There are 6-inch long iron rods cast into the crest of the lip of the Seabright Dam spillway which would allow the installation of flashboards, however, flashboards are not used. The spillway gate is secured with chains and padlocked between operations. The sluice gate handle for the control is removed between operations, but the gate is not locked.

2.4 EVALUATION

- a. Availability. No data available regarding design (including structural, hydrologic, and hydraulics), or construction of the facilities.
- b. Adequacy. The lack of in depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and engineering judgment.

There is a lack of data regarding structural damage related to past floods and the extent of any post-flood repairs made.

- c. Validity. Not applicable.

g. Dam.

Type - Concrete and stone masonry gravity dam with earth embankment wing walls.

Length - West embankment approximately 150 feet, concrete and stone masonry gravity section 98 feet, East embankment 124 feet.

Height - 19.5 feet from streambed to spillway crest

Top Width - 8 feet

Side Slopes - See X-sections in Appendix B-1

Zoning, Impervious Core, and Cutoff - See X-sections in Appendix B-1.

h. Division and Regulating Tunnel. Not applicable.

i. Spillway. (Emergency)

Type - Concrete broad crest with a sharp crested lip. See X-sections in Appendix B-1.

Length - 52.5 feet

Crest Elevation - Approximately 124.6 feet

Gates - There is a vertical timber lift gate in the 4-foot wide gated spillway, located in the west end of the emergency spillway.

j. Regulating Outlets.

Type - Drain from bottom of upstream channel.

Length - Outlet conduit is 13.2 feet long.

Closure - The regulated outlet is closed by a timber gate 4 feet wide and 3 feet high.

Access - From downstream outlet of conduit only.

Regulating Facilities - The gate is operated by a manual vertical screw system.

- d. Reservoir. The length of the maximum pool (Elevation 127.0) and the recreation or normal pool (Elevation 124.0) were estimated from a USGS map. The lengths are shown below.

LOCATION	LENGTH (feet)
Maximum Pool	8650
Recreation/Normal Pool	8450

- e. Storage. Storage volumes for Seabright Pond were estimated by planimetering surface areas from a USGS map and multiplying by an average of known water depths at the dam and inlet to the pond. The 10 March 1978 inventory sheet shows the normal impounding capacity to be 1970 acre-feet. This capacity would assume an average depth in the pond greater than the height from normal pool to the invert of the river channel at the dam outlet. Therefore, the estimated storage volumes in the following table were used instead of those in the inventory sheet for this study.

ITEM	STORAGE (acre-feet)
Recreational/Normal Pool	825
Design Surcharge	Unknown
Top of Dam	970

- f. Reservoir Surface. The following are surface areas for Seabright Pond.

ITEM	SURFACE AREA (acres)
Top of Dam	99
Emergency Spillway Crest	97

ITEM	DISCHARGE (cfs)
Maximum flood at Damsite	Unknown
Ungated Spillway Capacity at Maximum Pool Elevation	527
Gated Spillway Capacity at Normal Pool Elevation (124.0 feet)	50
Gated Spillway Capacity at Maximum Pool Elevation (127.0 feet)	186
Total Capacity at Maximum Pool Elevation	995

c. Elevations. Survey data collected at the Seabright Dam was referenced to a temporary benchmark. The following elevations were later referenced to USGS mean sea level datum by assuming that the normal pond elevation shown on the USGS map (Elevation 124) is equal to an elevation 0.6 feet below the emergency spillway elevation. This appears to be a reasonable estimate of normal pool elevation based on visual observations at the dam.

LOCATION	ELEVATION (feet above MSL)
Top of Dam	128.0
Maximum Pool - Design Discharge	Unknown
Full Flood Pool	127.0
Recreation Pool	124.0
Spillway Crest (Gated)	121.2
Diversion Tunnel Invert	Not Applicable
Streambed at Centerline of Dam	106.0
Maximum Tailwater	Unknown
Top of Abandoned Generator Room	127.0
Emergency Spillway Crest	124.6

repaired about 1963. A new reinforced concrete bulkhead was placed in the upstream face of the generation room in 1975 and a new spillway gate was installed in 1975.

- i. Normal Operating Procedure. The gates are operated at the Seabright Dam only to facilitate maintenance since the owner of the dam presently makes no use of the stored water. At the time of inspection (July 17, 1978), the spillway gate was open and the reservoir level was at approximate Elevation 123 or about 1.6 feet below the spillway crest. The water level was being maintained low by the owner due to his concern for the stability of the retaining wall in the west embankment. There are 6-inch long iron rods cast into the crest of the lip of the Seabright Dam spillway which would allow the installation of flashboards, however, flashboards are not used. The spillway gate is secured with chains and padlocked between operations. The handle for control of the sluice gate is removed between operations, but the gate is not locked.

1.3 PERTINENT DATA

- a. Drainage Areas. The drainage area above Seabright Dam is approximately 34.0 square miles and lies in portions of the Seasmont, Lincolnville, Hope and Camden Townships. About 10 percent of the entire drainage area is storage at Seabright Pond, Megunticook Lake and Norton, Levenseller, Moody, Hobbs and Fish Ponds. The watershed has a rolling topography varying in elevation from about 107 feet to about 1100 feet.
- b. Discharge at Damsite. No records of high water could be located. Therefore, maximum known flood height at the dam could not be determined. The following pertinent discharges were estimated. All discharges in the following table are referenced to pool level at the top of the dam (Elevation 128.0). The gated outlet is 36 inches wide by 48 inches high with an upstream invert elevation of about 107.5 feet and a downstream invert elevation of about 105 feet. The gate is operable, but it reportedly would not close until the pond empties. The test flood (MPF) elevation at the dam is about 140.5 feet.

- b. Description of Dam and Appurtenances. The Seabright Dam is a mortar laid stone masonry and concrete gravity dam with earth embankment wing walls. The west embankment is about 150 feet long and the east embankment is about 124 feet long. The stone and concrete portion of the dam is about 98 feet long. The height of the dam is about 23 feet.
- c. Size Classification. Based on storage capacity the Seabright Dam is classified as a small size dam. The dam has a height of about 23 feet.
- d. Hazard Classification. In the event of failure of the Seabright Dam, approximately 10 year-round dwellings located within 1/2 mile of the dam would be damaged. Considerably more industrial, commercial and residential structures are located directly over or adjacent to the Megunticook River as it passes through the town of Camden. Thus the Seabright Dam is classified as having a high hazard potential.
- e. Ownership. The Seabright Dam is owned by the Seabright Development Corporation, P.O. Box 525, Rockland, Maine.
- f. Operator. Mr. O. Lie-Nielson
P.O. Box 525
Rockland, Maine
Telephone No. 207-594-7215
- g. Purpose of Dam. Presently the dam serves no purpose for the owner. It is anticipated by the owner that hydro-electric power generation can be realized at this project in the future. The dam does presently retain a pond used for recreation by the public and camp owners.
- h. Design and Construction History. No information is available regarding the design of the Seabright Dam. It was constructed between 1890 and 1900. The dam was constructed to supply hydro-mechanical power for a mill at the site. The dam facility had been modified to include a hydro-electric generator (260 KW) which has since been removed. The concrete apron on the dam was reportedly

along with performance history and engineering judgment.

c. Urgency. The recommendations and remedial measures outlined below should be implemented within 12 months after receipt of this report by the owner.

d. Need for Additional Investigation. The spillway discharge capacities of this and other dams inspected on the Megunticook River are inadequate. Further hydrologic studies are necessary to access the flood discharge characteristics of the watershed and to establish appropriate parameters for the design of spillway improvements for the several dams on the Megunticook River.

7.2 RECOMMENDATIONS

The following recommendations regarding structural rehabilitation to assure the overall long term safety of the dam should be investigated by a qualified engineer and implemented within 12 months after receipt of this report by the owner.

1. The concrete lip at the crest of the spillway should be removed and replaced. This lip is severely cracked and substantial leakage is occurring from beneath the lip into the stone masonry. Continued leakage will accelerate deterioration of both the concrete apron and stone masonry portions of the dam.
2. A concrete downstream face should be constructed to secure the stone masonry of the spillway section of the dam. This concrete section would have to have adequate drainage and would have to be doweled into the spillway apron. This concrete face should be sufficient to prevent loss of the stone masonry during high flood flows. Repair of the stone masonry, including new grouting, appears to be an inadequate solution.
3. Fill should be placed downstream of the retaining wall at the west embankment to provide stability for the embankment since

the existing wall has deflected to a point where failure could occur if further deflection occurs. This fill should be free draining material and the downstream face of this fill should be protected against erosion.

4. Refill and protect against erosion (in a manner similar to the remainder of the west embankment) that portion of the west embankment adjacent to the generator room and upstream wing wall.
5. Enlarge or alter the spillway to improve the discharge capacity at the dam.

7.3 REMEDIAL MEASURES

- a. Alternatives. In lieu of remedial construction of the Seabright Dam, the dam could be breached through the generator room section. An evaluation of the stability of the side walls of the generator room would be needed and supports may be necessary, but if this section were breached a 100-year flood could be passed without flow over the emergency spillway of the dam.
- b. Operating and Maintenance Procedures. A program of regular inspection and maintenance should be developed. The following maintenance actions and operating procedures should also be implemented.
 1. Repair all spalled surfaces of concrete and fill all joints and cracks.
 2. Remove the flashboard rods from the spillway crest since flashboards are not used and these rods could catch debris reducing the capacity of the spillway.
 3. Replace the timber beams supporting the service bridge and outlet gate works and replace other timber members of the bridge which are rotted.
 4. Install a locking mechanism for the outlet gate works.

5. Repair the crack in the concrete in the west spillway gate slide support.
6. Remove the diving board and ladder from the service bridge area of the dam.
7. The control bridge may act as debris collector during flood flows. Equipment and personnel should be made available to keep the spillway clear during flood flows.
8. Because the dam is upstream of populated areas and is subject to overtopping and subsequent distress, around the clock surveillance should be provided during periods of high precipitation or anticipated run-off (full spillway).
9. A formal warning system which could be used in the event of an emergency should be developed and implemented.
10. The dam should be inspected by a qualified engineer at least once every two years.

APPENDIX A
FIELD INSPECTION NOTES

Inspection Date: July 18, 1978

Inspection Team:

<u>Name</u>	<u>Discipline</u>
Frank Nader	Hydrology/Hydraulics
Brian Bisson	Hydrology/Hydraulics
Stephen Cole	Geotechnical
Henry Oatley	Structural
Peter Deletetsky	Survey
Ernest Jurick	Photographer

A. CONCRETE AND STONE MASONRY STRUCTURES

1. Concrete Surfaces. Generally the surfaces of the concrete portions of the dam are in good condition with little spalling or surface erosion present. Exceptions to the general condition are the downstream wall of the generator room, the crest lip of the spillway and the support of the outlet gate works. The downstream wall at the generator room is severely spalled with much of the reinforcing steel exposed. The lip of the spillway has spalled seriously, been repaired with a new surficial layer of concrete, and again spalled or broken away. The surface of the east training wall is eroded somewhat but appears to be in good condition.

Stone Masonry Surfaces. The downstream face of the Seabright Dam consists of grouted (mortar-laid) stone masonry. The mortar is badly deteriorated and has been lost from many joints. The face has a bulging appearance (bowed as much as 12" downstream). Many of the stones in the masonry face are loose and can be moved easily by hand. The masonry consists of irregular shapes and sizes of stones which are not tightly locked together. See photographs 1 and 2.

2. Structural Cracking, Concrete. Cracks were observed in the lip of the spillway in several locations, all cracks appear stress related (see photograph 4). The upstream pier at the outlet works is badly cracked. The east training wall is badly cracked, see photograph 4. A large crack exists in the east wall of the generator room, and the dam crest is cracked west of the spillway gate. See photograph 5.

Structural Cracking, Stone Masonry. The lintel over the outlet sluiceway is cracked. Although much of the stone masonry is loose, no crack patterns are apparent.

3. Movement - Horizontal and Vertical Alignment. No evidence of vertical movement was observed. The spillway lip has deflected downstream as much as 3 inches at the east training wall and is out of plumb throughout most of its length. See photograph 4. The stone masonry downstream face of the dam appears to have bulged downstream.
4. Junctions. The spillway lip is badly cracked at its junction to the east training wall and at the outlet works pier. The junction at each wing wall to the spillway apron show signs of distress.
5. Drains. No formal drainage system was observed. The stone masonry portion of the dam has inherent drainage characteristics.
6. Water Passages. Except for the lip of the spillway, the concrete surfaces of the spillway show only minor signs of wear. The control outlet sluiceway is constructed of stone masonry and shows no signs of erosion or deterioration.
7. Seepage or Leakage. A substantial volume of seepage was observed coming through the downstream face of the dam. This seepage appears to be coming through the spillway apron beneath the lip. The western half of the spillway shows only minor seepage but the easterly portion is undergoing heavy seepage. Several GPM of seepage was observed coming from the stone masonry beneath the east wing wall and from a crack west of the gated spillway. See photograph 2.

8. Monolith Joints, Construction Joints. The joint at the lip of the spillway is open as much as 1/2" due to the tilt or deflection of the lip. The other construction joints observed, in the wing walls and training walls, appeared tight.
9. Foundation. The foundation of the Seabright Dam is probably soil supported based on available information. No undermining of the foundation or distress of the foundation is apparent.
10. Abutments. See B-6 below.

B. EMBANKMENT STRUCTURES

1. Settlement. No generalized settlement was observed in the west embankment of the dam structure, however about 6 inches of subsidence has occurred directly upstream of the stone wall which retains the downstream face of the embankment, (see x-sections).

No settlement was observed in the easterly embankment of the dam.

2. Slope Stability. The stone wall retaining the west embankment, which was previously a foundation wall of a mill building, since razed, is displaced downstream by at least 1-foot at the top. See photograph 9.

The east embankment shows no signs of instability.

3. Seepage. No seepage was observed on or at the toe of embankment areas, and no evidence of past seepage was noted. The embankment areas are tree covered. No animal burrows were found.
4. Drainage Systems. No drainage systems were observed or are known to exist in the embankments.
5. Slope Protection. The upstream face of the west embankment is protected by a concrete wingwall (Top at elevation 128) for approximately 30 feet from the generator room. The remainder of the embankment is riprapped to approximately elevation 128 (MSL). This riprap is in good condition. The

remaining surface area of the west embankment is covered by grass, bushes, and trees. Some apparent minor surface erosion was noted on the west embankment near its junction with the generator room and the westerly upstream wing wall. The 1 to 2-foot deep depression in this area has been partially filled with waste concrete (possibly left over from the construction of the bulkhead inside the generator room).

The upstream face of the east embankment is a concrete wall extending up to Elevation 128. The surface of the embankment is tree and bush covered. No surface erosion was observed.

6. Abutments. The abutments of the dam are the soil deposits on the valley walls apparently consisting of silts and sands on the west side and glacial till on the east. The earth embankments match into the abutments and no distress is apparent.

C. SPILLWAY STRUCTURES

The spillways at the Seabright Dam consist of a gated spillway 4 feet wide and a broad crested emergency spillway 52.5 feet long. The emergency spillway is provided with 6-inch long rods for the installation of flashboards, however flashboards are reportedly not used.

1. Control Gates. The spillway control gate consists of a timber vertical lift gate in steel gate slides. It is manually operated by a rack and gear. The gate works are in generally poor repair. The timber supports show signs of rot and the concrete west of the gate is cracked and water seeps through the crack.
2. Unlined Saddle Spillways. A slight depression in the earth embankment at the east abutment would act as a saddle spillway when water levels approach Elevation 128. This area is grass and brush covered and shows no indication of erosion but it is not highly resistant to erosion and would likely erode if subjected to water flow for an extended period of time.

3. Approach and Outlet Channels. The approach and outlet channels are clear and unobstructed.
4. Stilling Basin. No special features are provided for a stilling basin. The stilling basin area is stone and boulder lined and serious scour or erosion is not apparent.

D. OUTLET WORKS

The regulated outlet consists of a 3 x 4 foot gate with the invert at approximate Elevation 108.

1. Intake Structure. The intake structure could not be observed due to water levels. The inlet area did, however, appear to have a substantial deposit of silt, up to 3 feet deep.
2. Operating and Emergency Control Gates. The control gate is a 3 x 4-foot timber gate which is manually operated by a vertical screw. The timber supports for the hoisting screw are badly rotted and one of the concrete supports is badly cracked. The service bridge beams are rotted at the bearings. The gate reportedly cannot be closed unless the reservoir is drained due to hydrostatic pressure on the gate and the inadequacy of the timber hoist supports. A diving board and ladder have been attached to the service bridge and outlet gateworks.
3. Conduits, Sluices, Water Passages. The water passage through the dam from the outlet gate consists of dry laid stone masonry. The lintel stone over the outlet is cracked but shows no displacement. The interior of the conduit shows no signs of erosion. Some leakage occurs around the gate which sets in steel gate slides in the concrete upstream face of the dam.
4. Stilling Basin. See C-4 above.
5. Approach and Outlet Channels. Based on visual inspection, there appears to be a 3 to 4 foot build-up of silt upstream of the outlet gate.
6. Drawdown Facilities. The regulated outlet was reported to be operational within the year preceeding the inspection. It was not operated during the inspection however, because closure reportedly requires draining the pond.

E. SAFETY AND PERFORMANCE INSTRUMENTATION

No instrumentation is present at the dam.

F. RESERVOIR

1. Shore Line. No major active or inactive landslide areas on Seabright Pond were observed.
2. Sedimentation. The watershed is essentially rural in nature. There are no new developments or new sources of significant sediment loads on the lake.
3. Potential Upstream Hazard Areas. Seabright Pond has several cottages surrounding it, many of which would be affected by maximum probable flood elevations, but not by maximum water storage pool elevation.
4. Watershed Runoff Potential. The watershed has remained essentially rural with very few changes in development over the past 50 years.

G. DOWNSTREAM CHANNEL

The channel downstream of the dam should have sufficient capacity to carry away flood flows from the dam. In the event of failure of the Seabright Dam, approximately 10 seasonal and year-round dwellings located within a 1/2 mile of the structure would be damaged.

H. OPERATION AND MAINTENANCE FEATURES

1. Reservoir Regulation Plan. No formal plan is available.
2. Maintenance. The only recent maintenance to the facilities observed is repair to the spillway gate. The gate stem has been spliced to repair reported vandalism.

APPENDIX B
ENGINEERING DATA

This appendix lists the engineering data collected either from project records and other sources or data developed as a result of the visual inspection. The contents of this appendix are listed below.

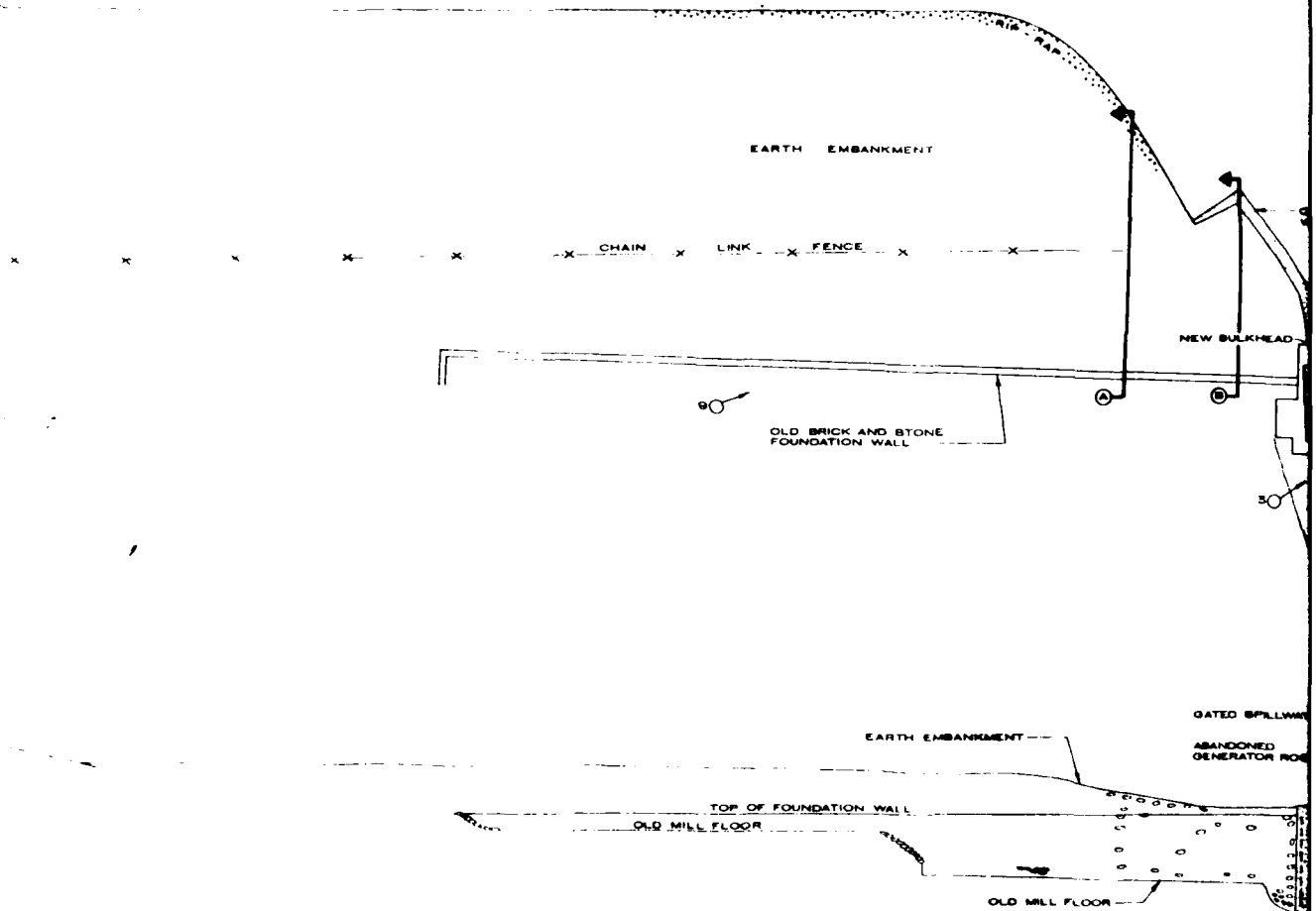
<u>Appendix</u>	<u>Description</u>
B-1	General Project Data

APPENDIX B-1

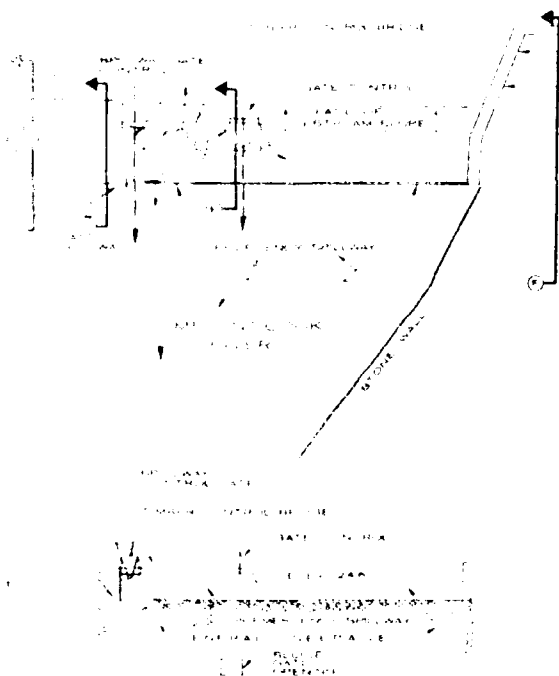
GENERAL PROJECT DATA

No as-built drawings are available for the Seabright Dam. A plan, a profile and several X-sections have been developed based on data obtained during the visual inspection. These drawings are attached to this section.

B-1.1



100 FEET



CONCRETE WALL

EARTH EMANATIONMENT

* *Journal of the American Medical Association*

EARTH ENVELOPMENTS

FORMAT OF CUD GRADING

$\chi^2 = 0.87$, $p = .64$

FIG. 1. EFFECT OF GRAPE
LEAF ORIENTATIONS

EDWARD J. JORDAN CO., INC.
PLANT # 1000
WALTHAM, MASS.

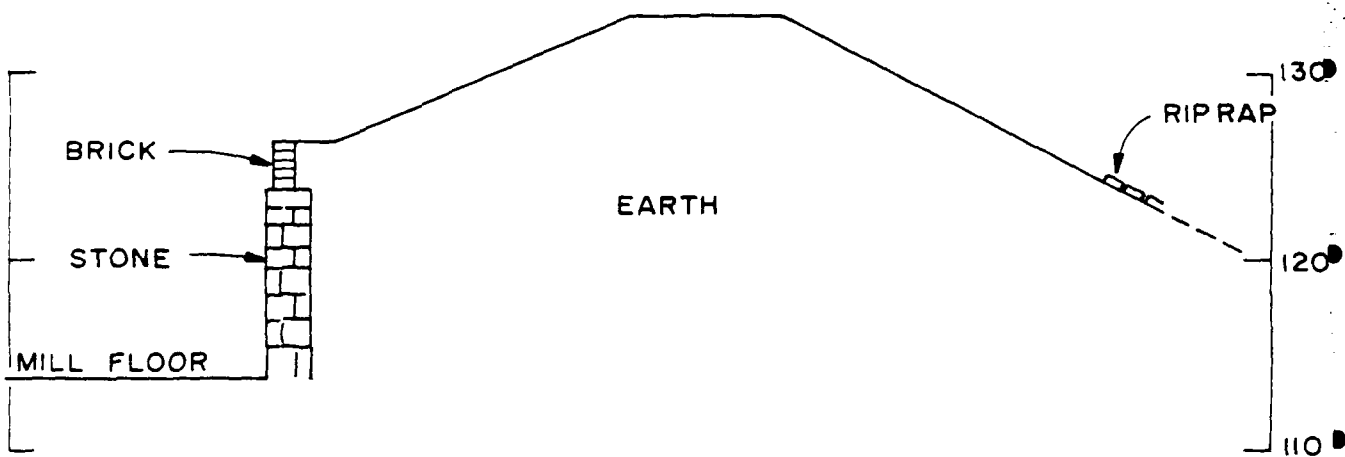
U.S. ARMY ENGINEER DIVISION, ENGLAND
COMPS / ENGINEERING
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

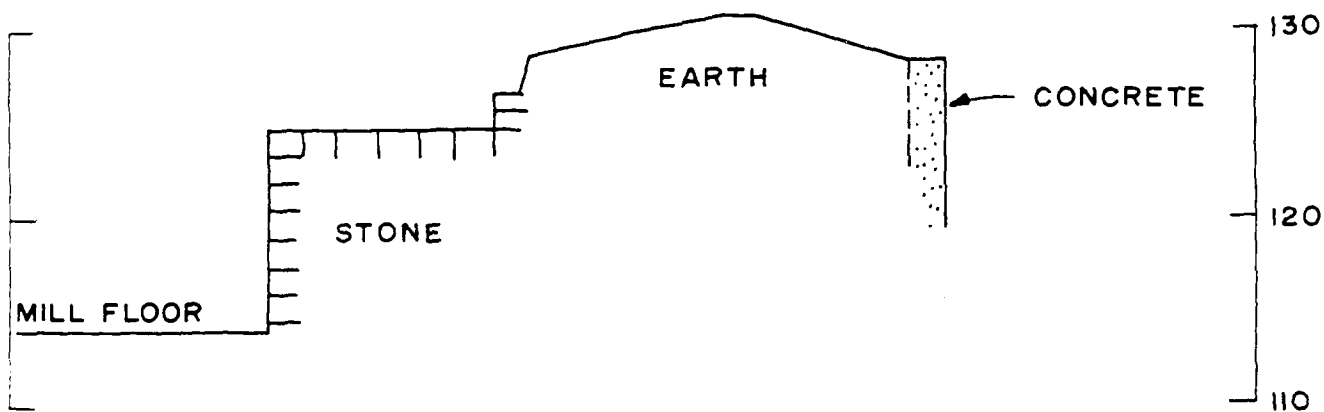
SEABRIGHT DAM
PROFILES

MILL RIVER MAINE

AS SHOWN
AUGUST 1978



SECTION A



SECTION B

0 5 10 15 FEET

EDWARD C. JORDAN, C.E.	U.S. ARMY ENGINEER DIVISION, BOSTON DISTRICT
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	
SEABRIGHT DAM	
X - SECTIONS	
MEGUNTICOOK RIVER MAINE	
SCALE 1" = 20'	DATE AUGUST 1978

PROJECT SEABRIGHT DAM HYDRAULICS	COMP BY BTD	JOB NO. 7-573 05
	CHK BY BTD	DATE 9-14-78

$$Q = CA\sqrt{2gh}, c = 0.7, A = 12^2$$

Survey
Datum

Free Gate
Discharge

ELFV	Q, cfs	ELEV	Q
80.5		96.5	252
81		97	257
81.5		97.5	261
82		98	265
82.5		98.5	270
83		99	274
83.5		99.5	278
84		100	282
84.5	9.5	100.5	286
85	107	101	290
85.5	117	101.5	294
86	126	102	298
86.5	135	102.5	301
87	143	103	305
87.5	151	103.5	309
88	158	104	313
88.5	165	104.5	316
89	172	105	320
89.5	178	105.5	323
90	185	106	327
90.5	191	106.5	330
91	197	107	334
91.5	202	107.5	337
92	208	108	340
92.5	213	108.5	344
93	218	109	347
93.5	224	109.5	350
94	229	110	353
94.5	234	110.5	357
95	238	111	360
95.5	243	111.5	363
96	248	112	366

PROJECT	MFCUNTIPOOK RIVER PROFILE	COMP BY	JOB NO.
		373	20583 05
		CHK BY	DATE
		SL	8-4-78

LOCATION	STATION	ELEV.
MSL	0+00	0.0
RT 1 (MAIN ST)	2+00	20
FT BRIDGE	4+00	
WASHINGTON ST	8+00	
KNOX DAM	10+50	50
KNOWLTON ST	15+00	60
-KNOWLTON DAM	16+50	
POWER LINE	37+50	
UNKNOWN BRIDGE	52+50	
ONTARIO RD	59+00	80
WASHINGTON ST	63+50	
TENT CO. DAM	76+00	
MT. BATTIE RD	87+50	95
CONTOUR 100	92+50	100
SEABRIGHT DAM	100+50	120
MEG LAKE BRIDGES	185+00	122-123
MEG W. DAM	187+00	140
MFC E DAM	188+50	140
KNOX/WALDO CNTY	293+50	
INLET MEG LAKE	324+00	
RT 52/173 BRIDGE	455+00	
INLET NORTH POND	471+00	
ELEV. 150	549+00	150

LUG PEARSON III ANALYSIS FOR KEITLE BROOK AT WORCESTER, MA STA 01109500 1923-59 36 ITEMS

ANNUAL PEAK FLOW DATA USED (CFS)						36 VALUES	
740.00	450.00	400.00	230.00	790.00	473.00	116.00	935.00
404.00	586.00	570.00	1020.00	2520.00	429.00	1300.00	337.00
500.00	219.00	540.00	237.00	291.00	312.00	396.00	213.00
393.00	162.00	195.00	596.00	508.00	584.00	1530.00	1970.00
852.00	246.00	687.00	747.00				

ANNUAL FLOOD STATISTICS

LOGS OF FLOWS		FLOWS (CFS)	
MEAN	2.697	679.9	
STANDARD DEVIATION	0.322	724.78	
SKEWNESS	0.628	3.303	
GENERALIZED SKEWNESS	0.660		
WEIGHTED SKEWNESS	0.654		

PROBABILITY CALCULATIONS USING WEIGHTED SKEWNESS

EXCEEDANCE PROB	RECURRENCE INTERVAL	MAGNITUDE (CFS)	K VALUE
0.990	1.01	126.558	-1.846
0.950	1.05	171.058	-1.439
0.900	1.11	205.840	-1.190
0.800	1.25	263.899	-0.855
0.500	2.00	459.605	-0.107
0.200	5.00	896.402	0.792
0.100	10.00	1334.286	1.328
0.040	25.00	2120.197	1.953
0.020	50.00	2923.178	2.386
0.010	100.00	3964.237	2.796
0.005	200.00	5306.869	3.189
0.002	500.00	7687.765	3.689

PROJECT	COMPUTATION OF FLOOD FLOWS AT SEABRIGHT DAM	COMP BY	JOB NO.
		RTD	7-513 CS
		CHK BY	DATE
		SL	8-4-78

D.A = 34.0 Sq Mi

Total Pond Area in Basin = 3.21 Sq Mi

$$\frac{3.21}{34.0} \times 100 = 9.4\%$$

Use Similar Watershed to Determine
Flood Flows:

USES Kettle Brook Gage

in Worcester, MA, D.A = 31.55 Sq Mi

Period of Record 1923-59

The following is from log-Pearson
Type III analysis (weighted skew)
(Several Reservoirs and ponds
upstream of gage (~10%))

Recurrence Interval	Kettle Brook = Seabright Dam Magnitude, cfs
2	460
5	596
10	1334
25	2120
50	2924
100	3964
200	5307
500	7688

9. The elevation of the top of the dam is 127 feet.
10. The elevation of the crest of the gated spillway is about 121.2 feet and the length of weir is 4 feet. The elevation of the emergency spillway is about 124.6 feet and the length is 52.5 feet. Both spillways are broad crested as shown on the plans and X-sections in Appendix A-1.
11. The sluice gate regulated outlet is 36 inches wide by 48 inches high. The upstream invert is about 107.5 feet and the downstream invert is about 105 feet.
12. The emergency spillway is described under paragraph 10.
13. There are no flashboards installed at the dam, although 6-inch long rods are present in the spillway crest allowing for the installation of nonfailing flashboards at least 6 inches high.
14. The elevation of the easterly wing wall is about 128 feet. The elevation of the west earth embankment is about 133 feet.
15. There are no identified hydrometeorological gages in the watershed.
16. The Megunticook River runs in a relatively narrow flood plain from the Seabright Dam to the ocean.

The river channel is rocky, but is quite steep with an average slope of more than 1 percent between Seabright Dam and the ocean. Reportedly 10-year frequency flood flows (1330 cfs) have not caused appreciable damage.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

No design data is available for the Seabright Dam. An analysis has been made which includes a hazard determination, estimation of full spillway discharge, and overtopping potential. Tailwater rating curves are not available due to the lack of channel configuration data. Flood flow discharges to Seabright Dam were calculated by performing a log-Pearson Type III statistical analysis of a similar USGS gaged watershed. The similar watershed was Kettle Brook at Worcester, MA. (Station Number 01109500). The hydrologic map of the watershed is reproduced as the Location Map. The analyses are attached to this section.

Elevations listed in this report are referenced to USGS mean sea level datum by assuming that the normal pond elevation shown on the USGS map (Elevation 124) is equal to an elevation 0.6 feet below the emergency spillway elevation.

1. The drainage area contributing to Seabright Dam is about 34.0 square miles. The watershed is very hilly, uncharacteristic of most coastal drainage areas, with elevations ranging from about 107 to 1100 feet at the drainage divide.
2. The pool elevation of the top of the conservation or normal pool is taken as 124 feet.
3. Storage capacity at spillway crest (124.6 feet) has been estimated to be about 870 acre-feet.
4. The elevation at the top of flood control pool (or full spillway) is 127.0 feet.
5. The storage capacity (incremental) of the flood control pool is about 290 acre-feet.
6. The elevation of the maximum design pool is unknown.
7. Surcharge capacity is unknown.
8. There is 1 foot of freeboard available at the assumed flood control elevation.



9

DOWNSTREAM VIEW OF WESTERLY EMBANKMENT



10

VIEW DOWNSTREAM FROM DAM



7

GATE OPERATOR



8

DOWNSTREAM VIEW OF ABANDONED GENERATOR ROOM
AND GATED SPILLWAY



5

GATED SPILLWAY



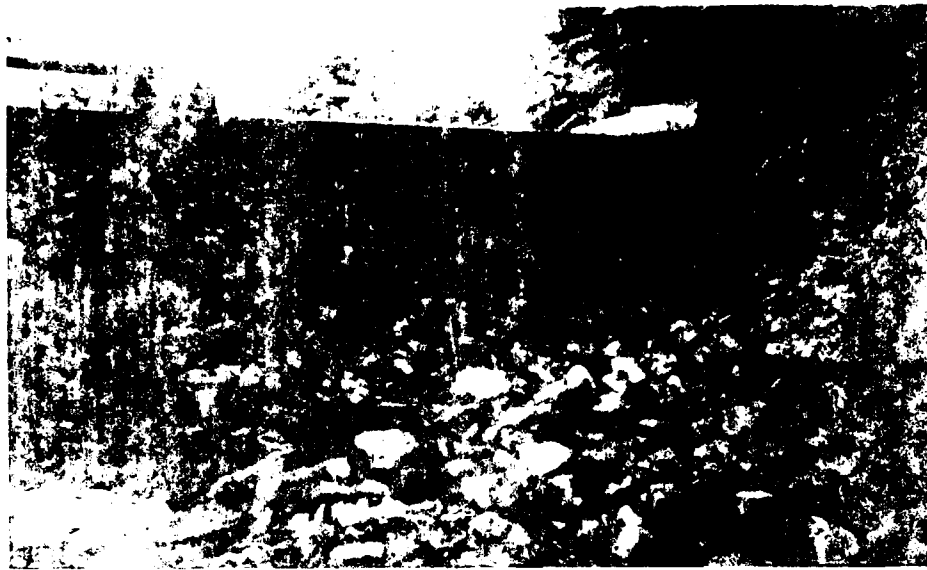
VIEW OF DAM FROM DAM

REPRODUCED AT GOVERNMENT EXPENSE



5

DOWNSTREAM VIEW OF ADJUSTED
GENERATOR ROOM



1

UPSTREAM FACE OF EMERGENCY SPILLWAY



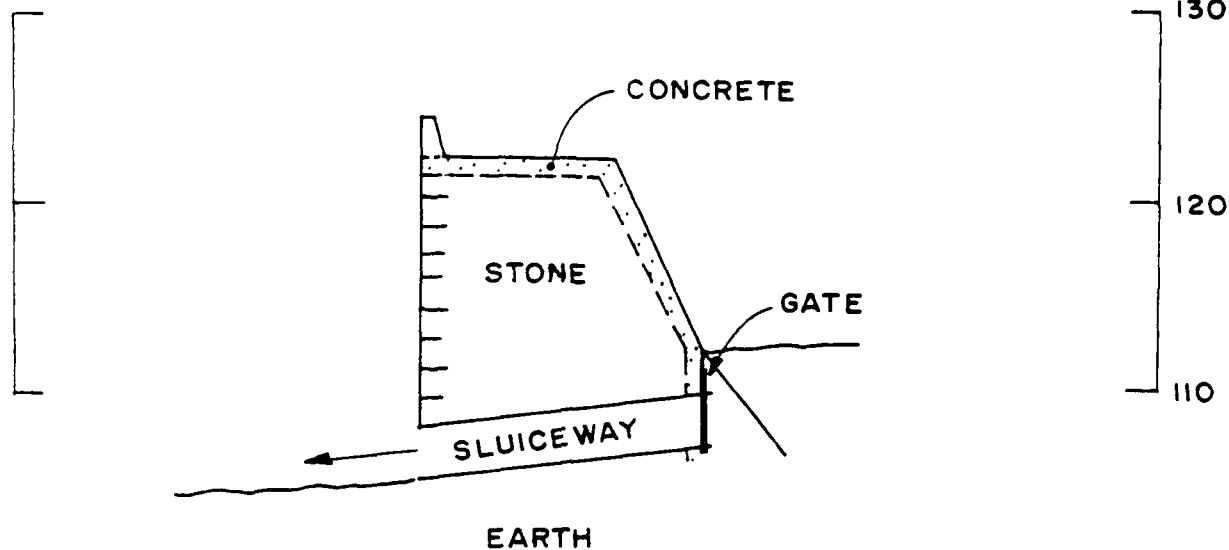
2

DOWNSTREAM FACE OF EMERGENCY SPILLWAY AND GATED SPILLWAY

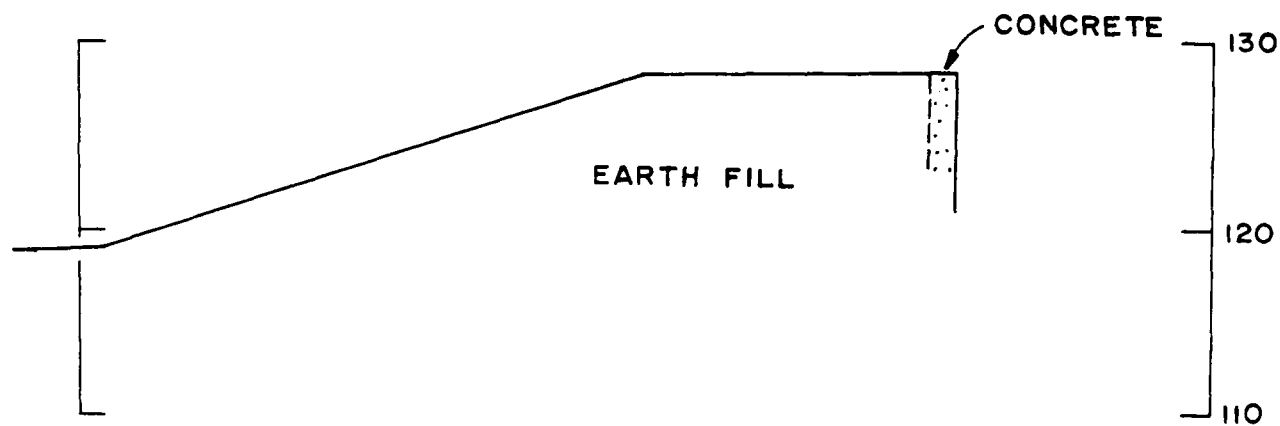
APPENDIX C

PHOTOGRAPHS

The following are photographs referenced in this report.
See sheet B-1.2 for photograph locations and orientations.



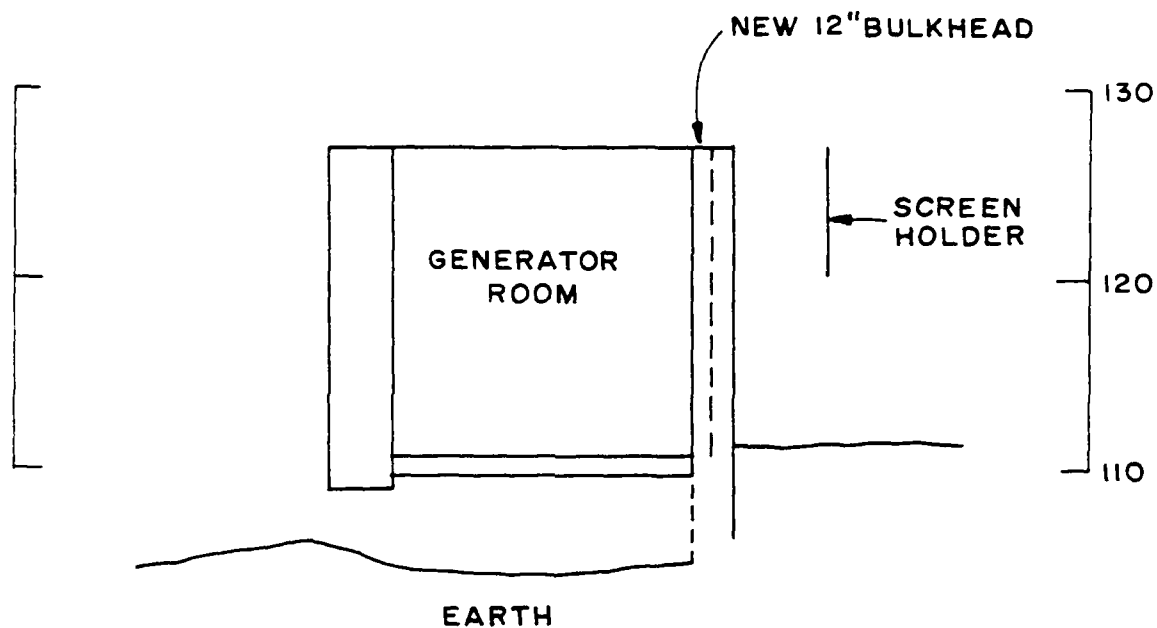
SECTION E



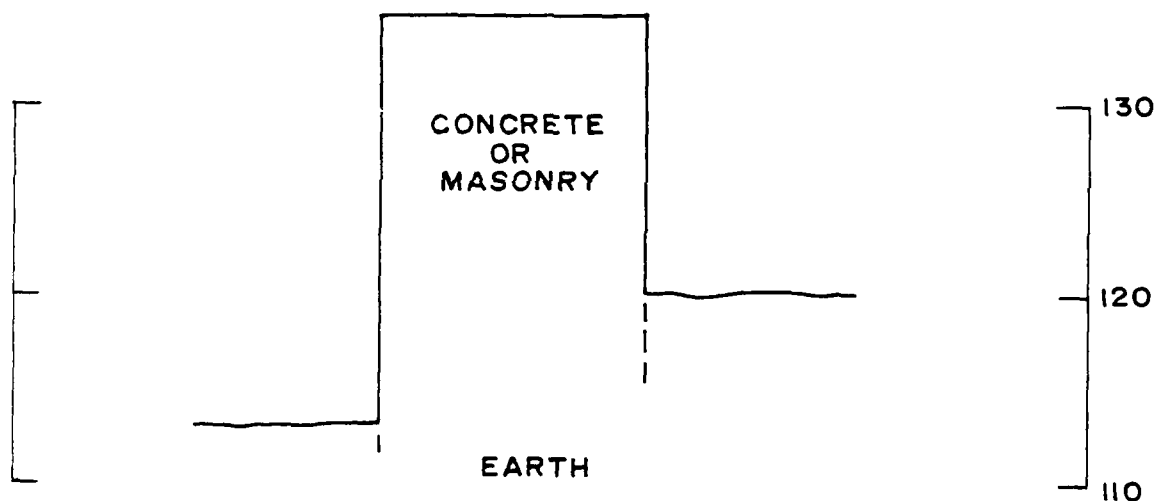
SECTION F

10 5 10 15 FEET

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER DISTRICT NEW ENGLAND CORPS OF ENGINEERS BOSTON, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	
SEABRIGHT DAM	
X-SECTIONS	
MEGUNTICOOK RIVER	MAINE
DATE AUGUST 1978	



SECTION C



SECTION D

10 5 10 15 FEET

FERRELL CORP. CO. INC.		U.S. ARMY ENGINEER DISTRICT (EOL) AND STATE OF MAINE NATIONAL DAMS	
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS			
SEABRIGHT DAM			
X-SECTIONS			
MEGUNTICOOK RIVER MAINE			
SCALE 1" = 10'		DATE 7/26/57 1978	

PROJECT SEABRANT DAM HYDRAULICS	COMP BY EJB	JOB NO. 7058305
	CHK BY EJB	DATE 5-14-78

ELEV Free Gate
 q, cfs

112.5	369
113	372
113.5	375
114	378
114.5	381
115	384
115.5	387
116	390
116.5	393
117	396
117.5	399
118	402
118.5	404
119	407
119.5	410
120	413

Survey Datum	ELEV.	Weir (1) C	Weir (1) Q CFS	Weir (2) C	Weir (2) Q CFS	Weir (3) C	Weir (3) Q CFS	Weir (4) C	Weir (4) Q CFS	Spilling Capacity
94.5	94.5	246	28							22
94.5	94.5	268	16							74
95.5	95.5	266	26							144
96.5	96.5	270	38							227
97.5	97.5	273	52							323
98.5	98.5	278	67							425
99.5	99.5	282	83	27	36					544
100.0	100.0	292	107	27	120					668
		332	127	264	230					801
			163	264	363					941
			186	27	527					1089
			211	2.89	749					1244
			237		951					1405
			263		1160					1605
			290		1400					1805
			319		1604					2005
			348		1904					2205
			379		2174					2405
			409		2457					2605
			440		2750					2805
			473		3054					3005
			506		3369					3205
			540		3694					3405
			574		4028					3605
			610		4372					3805
			644		4726					4005

PROJECT SEA BRIGHT DAM HYDRAULICS	COMP BY 12712	JOB NO. 205F3 05
	CHK BY [Signature]	DATE 7-25-78

Survey Datum ELEV.	Weir ① Q cfs	Weir ② C	Weir ② Q cfs	Weir ③ C	Weir ③ Q cfs	Weir ④ C	Weir ④ Q cfs
108.5	682	289	5089	263	1904	263	1573
108.5	720		5460		2086		1747
109	758		5840		2272		1927
109.5	796		6225		2464		2113
110	836		6625		2663		2304
110.5	876		7030		2863		2501
111	916		7442		3070		2703
111.5	957		7863		3282		2913
112.5	999		8291		3498		3123
113	1041		8726		3717		3333
113.5	1084		9169		3945		3560
114	1128		9627		4175		3790
114.5	1172		10054		4407		4025
115	1216		10541		4649		4254
115.5	1262		11012		4889		4483
116	1307		11497		5136		4725
116.5	1354		11975		5386		4973
117	1400		12467		5641		5225
117.5	1448		12965		5899		5503
118	1496		13468		6161		5795
118.5	1543		13977		6427		6093
119	1592		14497		6697		6397
119.5	1642		15020		6970		6697
120	1692		15555		7246		6997
	1742		16085		7527		7131

PROJECT	COMP BY ETB	JOB NO.
	CHK BY YLB	DATE

Survey Datum ELEV	L=200' Q Weir (5) C=2.5	L=130' Q Weir (6) C=2.5
101.5		115
102		325
		597
103		919
		1285
104		1689
		2128
105		2600
		3102
106		3634
		4192
107		4777
		5386
108	178	6019
	500	6675
109	919	7354
	1414	8054
110	1976	8775
	2598	9516
111	3273	10277
	4000	11058
112	4773	11857
	5590	12674
113	6449	13510
	7348	14363
114	8286	15233
	9260	16121
115	10270	17024
	11314	17945
116	12351	18881
	13552	19833
117	14642	20800
	15811	

PROJECT	SEABRIGHT DAM HYDRAULICS	COMP BY	JOB NO.
		12TB	20583 CS
		CHK BY	DATE
		ALL	8-21-78

Survey Datum ELEV.	TOTAL DISCHARGE Q, cfs	ELEV	TOTAL DISCHARGE Q, cfs
80.5	0	97	309
81			328
		98	384
82			492
		99	631
83			804
84		100	995
	95		1276
85	107	101	1562
	117		2018
86	126	102	2625
	135		3340
87	143	103	4140
	151		5126
88	158	104	5970
	165		6981
89	172	105	8055
	178		9187
90	185	106	10373
	191		11608
91	197	107	12863
	202		14407
92	208	108	16106
	213		17951
93	218	109	19912
	224		21981
94	229	110	24152
	236		26418
95	246	111	28768
	259		31207
96	274	112	33724
96.5	290	113	36319
Survey Datum + 27" = height above MSL			38990

97 = 124 USGS DATUM

PROJECT SEABRIGHT DAM HYDRAULICS	COMP BY BTB	JOB NO. 70503 CS
	CHK BY [Signature]	DATE 6-21-78

Survey Datum ELEV	TOTAL DISCHARGE Q, cfs
113.5	41737
114.0	44550
	47433
-1.15	50383
116	
117	

PROJECT	STORAGE ABOVE SPILLWAY CREST STAIRRIGHT	COMP BY	JOB NO.
		ETD	2058305
		CHK BY	DATE
		ALL	F-2-78

MPF = 43,500 CFS

Water Surface Elev. (Above MSL)	Surface Area Acres	Storage Ac-Ft	Discharge cfs
124	77	0	309
125	77	77	384
	87	236	631
	97	394	795
	107	553	1542
	117	711	2625
130	127	870	4140
	137	1029	5770
	147	1187	8055
	157	1346	10373
135	167	1504	12863
	177	1663	16106
	187	1822	19912
	197	1980	24152
	207	2139	28768
	217	2297	33724
140	230	2456	38990
	237	2606	44550
	244	2757	50383
	251	2908	
	258	3058	
145	265	3208	
	272		
	279		
	286		
	293		
150	300		
	307		
	314		
	321		
	328		
155	335		
160	377	5466	

PROJECT	EFFECT OF SURCHARGE STORAGE	COMP BY	JOB NO.
		BTB	20583 05
		CHK BY	DATE
		ML	8-2-78

$Q_{p1} = \text{MAX PROBABLE FLOOD PEAK} = 43,500 \text{ CFS}$

WATER SURFACE ELEV. = 140.81 Above USGS
(TO PASS MPF) MSL

[97' site datum =
124' USGS]

VOLUME OF SURCHARGE (STOR₁):

Storage @ 140.81 = 2578 Ac-Ft

DA Tributary to Seabright Dam = 21,763 Ac

$$\text{STOR}_1 = \frac{2578}{21,763} \times \frac{12''}{1'} = \underline{1.42''}$$

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{\text{STOR}_1}{19}\right)$$

$$Q_{p2} = 43,500 \times \left(1 - \frac{1.42}{19}\right) = \underline{40,246 \text{ CFS}}$$

WATER SURFACE ELEV. = 140.22'
(TO PASS Q_{p2})

STORAGE = 2490 Ac-Ft

$$\text{STOR}_2 = \frac{2,490}{21,763} \times \frac{12''}{1'} = 1.37'' \text{ AVE. } \underline{1.40''}$$

PROJECT EFFECT OF SURCHARGE STORAGE	COMP BY BTD	JOB NO. 2058305
	CHK BY ML	DATE E-2-78

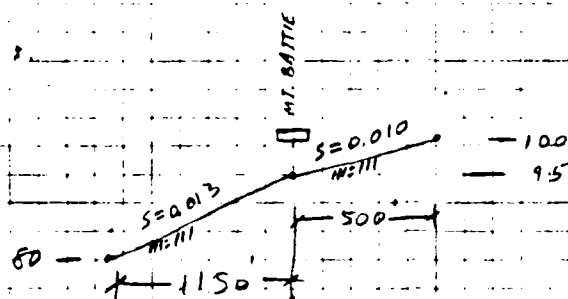
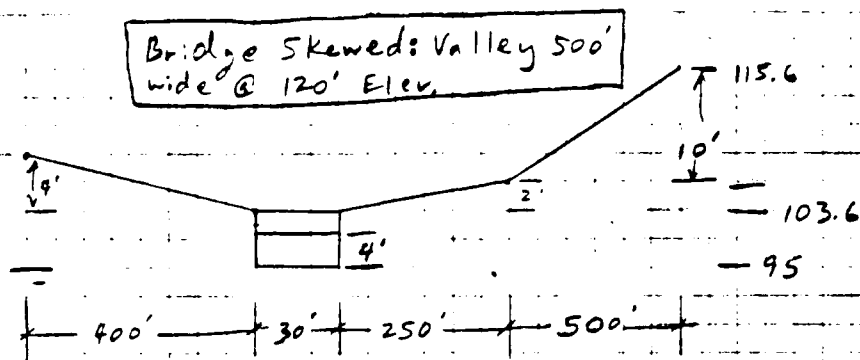
$$1.40" \times \frac{1'}{12"} \times 21,763 = 2539 \text{ AC-Ft}$$

SURCHARGE ELEV = 140.55'

$$Q_{p3} \approx \underline{\underline{42,100 \text{ CFS}}} @ \underline{\underline{140.55'}}$$

$$140.55 - 12.0 = 12.5' \text{ over-topping of dam}$$

PROJECT	MT. BATTIE BRIDGE	COMP BY	JTB	JOB NO.	20583
	- SECTION JUST UPSTREAM OF BRIDGE - SECTION D	CHK BY	ALA	DATE	8-3-78



Flow @ Elev. 101. (Full BAREX):

$$n = 0.045$$

$$Q = \frac{1.486}{0.045} \cdot 120 \left(\frac{120}{68} \right)^{2/3} (0.01)^{1/2} = 597 \text{ CFS}$$

$$V = \frac{597}{120} = 4.975 \text{ fps}$$

$$\text{STORAGE} = \frac{(120)(300)(L)}{43560} = 0.73 \text{ AC-FT}$$

PROJECT	COMP BY ETB	JOB NO. 20583 05
	CHK BY W	DATE 8-7-78

Flow @ Elev 105.0 :

Area over Bridge = 371¹⁷

$$R^{2/3} = \left(\frac{371}{500} \right)^{2/3} = 0.820$$

$$Q = \frac{1.486}{0.045} (371)(0.820)(0.01)^{1/2} = 1005$$

TOTAL Q = 1602 CFS

Flow @ Elev. 110.0 :

Area over Bridge = 1696¹⁷

$$R^{2/3} = \left(\frac{1696}{500} \right)^{2/3} = 2.258$$

$$Q = \frac{1.486}{0.045} (1696)(2.258)(0.01)^{1/2} = 12,649 \text{ CFS}$$

TOTAL Q = 13,246 CFS

Flow @ Elev. 115.0 :

Area over Bridge = 5700¹⁷

$$R^{2/3} = \left(\frac{5700}{500} \right)^{2/3} = 5.069$$

$$Q = \frac{1.486}{0.045} (5700)(5.069)(0.01)^{1/2} = 95,419 \text{ CFS}$$

TOTAL Q = 96,016 CFS

PROJECT	MT BATTIL BRIDGE	COMP BY	JOB NO.
	- SECTION JUST UPSTREAM OF BRIDGE - SECTION (1)	RTB	20583
		CHK BY	DATE
			8-7-78

ELEV	FLOW CFS
101	597
	848
	1100
	1351
105	1602
	3931
	6260
	8588
	10917
110	13246
	29800
	46354
	62908
	79462
115	96016

PROJECT	DOWNSTREAM DAM FAILURE HYDROGRAPHS	COMP BY	JOB NO.
		BTB	20583 05
		CHK BY	DATE
		<i>[Signature]</i>	8-16-78

$$Q_{p1} = \frac{8}{27} W_b \sqrt{g} Y_0^{3/2}$$

$$\frac{1}{2} Q_p T = 12.1 S$$

$$W_b = 0.4 (200) = 80' \quad \text{WESTERLY EARTH EMBANKMENT}$$

$$Y_0 = 100 - 79 = \underline{21'}$$

$$Q_{p1} = \frac{8}{27} (80) \sqrt{g} 21^{3/2} = 12,944$$

$$Q_{p1} = 12,944 \text{ CFS}$$

STORAGE AT FULL SPILLWAY:

$$\text{Length, } L = 8450'$$

$$\text{Ave } W = 500'$$

$$\text{Ave Depth} = \frac{19+1}{2} = 10'$$

$$S = \frac{10 (500) (8450)}{43560} = \underline{970 \text{ AC-FT}}$$

$$T_1 = \frac{12.1 S}{\frac{1}{2} Q_p} = \frac{12.1 (970)}{\frac{1}{2} (12944)} = \underline{1.81 \text{ hrs}}$$

STORAGE AT SPILLWAY CRFST:

$$S = \frac{\left(\frac{19+1}{2}\right) (500) (8450)}{43560} = \underline{825 \text{ AC-FT}}$$

PROJECT DOWNSTREAM DAM FAILURE HYDROGRAPHS	COMP BY ETB	JOB NO. 205E3 05
	CHK BY JL	DATE 5-16-78

X-SECTION ① @ MT BATTIE BRIDGE

$$Q_{p1} = 12,944 \text{ CFS}$$

$$\text{STAGE @ X-SECTION ①} = 109.87$$

INV. OF X-SECT
@ 95

$$V_1 = \frac{(14.87)(1300)(400)}{43,560} = \underline{\underline{177.5 \text{ AC-FT}}}$$

$$Q_{p2}(\text{TRIAL}) = Q_{p1} \left(1 - \frac{V_1}{S}\right)$$

$$Q_{p2}(\text{TRIAL}) = 12,944 \left(1 - \frac{177.5}{970}\right)$$

$$Q_{p2}(\text{TRIAL}) = 10,575 \text{ CFS}$$

$$\text{STAGE} = 108.85$$

$$V_2 = \frac{13.85(1300)(400)}{43,560} = \underline{\underline{165.3 \text{ AC-FT}}}$$

$$V_1(\text{AVE}) = \frac{177.5 + 165.3}{2} = \underline{\underline{171.45}}$$

$$Q_{p2} = Q_{p1} \left(1 - \frac{V_{\text{AVE}}}{S}\right) = 12944 \left(1 - \frac{171.45}{970}\right)$$

$$Q_{p2} = \underline{\underline{10,657 \text{ CFS}}}, \text{ Elev} = 108.9$$

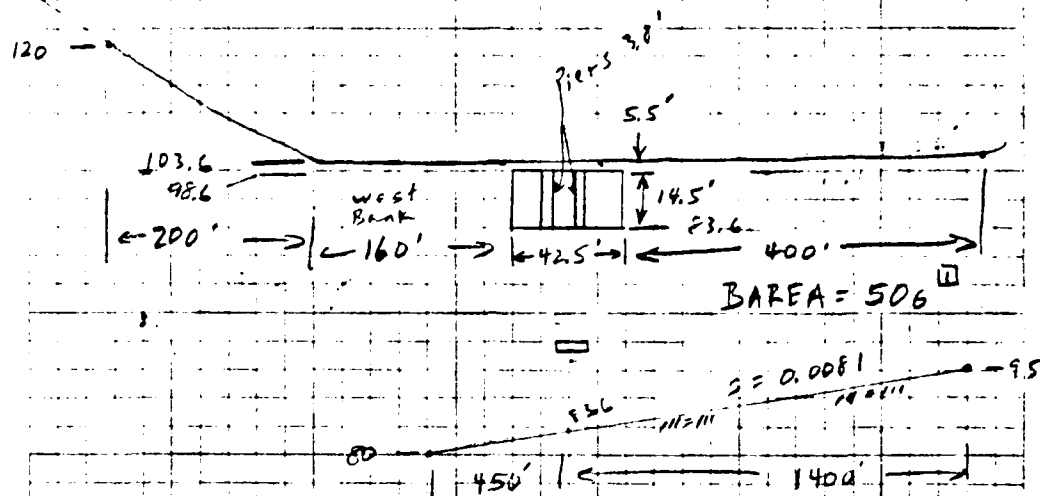
$$H = \underline{\underline{13.9'}}$$

PROJECT DOWNSTREAM DAM FAILURE HYDROGRAPHS	COMP BY BTE	JOB NO. 20583 05
	CHK BY JLH	DATE 8-16-78

$$\frac{1}{2} Q_p T_2 = 12.1 S$$

$$T_2 = \frac{12.1 (970)}{\frac{1}{2} (10857)} = \underline{\underline{2.20 \text{ hr}}}$$

PROJECT	WASHINGTON ST. BRIDGE - SECTION JUST UPSTREAM OF BRIDGE - SECTION (2)	COMP BY	JOB NO.
		ETB	20583 CS
		CHK BY	DATE
		LL	8-3-78



Flow @ Elev. 98.1 (Full Bridge):

$$\eta = 0.045$$

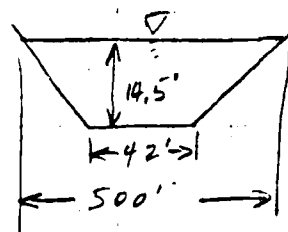
$$Q = \frac{1.486}{0.045} (506) \left(\frac{506}{1568} \right)^{1/3} (20081)^{1/2}$$

$$Q = \underline{\underline{3285 \text{ CFS}}}$$

Flood Plain Width = 500'

$$\text{Ave. Depth} = 98.1 - 83.6 = 14.5'$$

PROJECT	COMP BY	JOB NO.
	BTB	20583 05
SECTION ②	CHK BY	DATE
		8-17-78



Length = 2400'

Vol. of Storage:

$$S = \frac{42(14.5)(2400)}{43560} + \frac{(500-42)(14.5)(2400)}{2(43560)}$$

$$S = \underline{\underline{216.5 \text{ Ac-Ft @ El 98.1}}}$$

Flow @ Elev 105.0:

 $Q = \text{Bridge Flow} + \text{Flow above B. Deck}$

$$Q = 3285 + \frac{1.486}{0.045} \left(\frac{840}{600} \right) \left(\frac{840}{600} \right)^{2/3} (0.0001)^{1/2}$$

$$Q = \underline{\underline{6410 \text{ CFS}}}$$

STORAGE:

$$S = 216.5 + \frac{(105-98.6)(600)(2400)}{43560}$$

$$S = \underline{\underline{428.0 \text{ Ac-Ft @ El 105.0}}}$$

PROJECT	COMP BY	JOB NO.
	CHK BY	DATE
SECTION (2)	BTP	20563 05
		8-17-78

Flow @ Elev. 110.0 :

$$Q = \text{Flow @ El 105} + \text{Flow above 105}$$

$$Q = 6410 + \frac{1.486}{0.045} \left[(5)(600) + \frac{5(100)}{2} \right] \left(\frac{3250}{700} \right)^{2/3} (0.0081)^{1/2}$$

$$Q = 33,305 \text{ cfs}$$

STORAGE :

$$S = 428 + \frac{(110-105)(650)(2400)}{435.60}$$

$$S = 607 \text{ Ac-ft}$$

Flow @ Elev 107.0 :

$$Q = \text{Flow @ El 105} + \text{Flow above 105}$$

$$Q = 6410 + \frac{1.486}{0.045} \left[(2)(600) + \frac{2(20)}{2} \right] \left(\frac{1220}{620} \right)^{2/3} (0.0081)^{1/2}$$

$$Q = 12,105 \text{ cfs}$$

$$S = 428 + \frac{107-105(620)(2400)}{435.60}$$

$$S = 496 \text{ Ac-ft}$$

PROJECT	COMP BY	JOB NO.
	CHK BY	DATE
SECTION ②	1371	20583 05
	111	E-17-72

Flow @ Elev. 104.0 :

$Q = \text{Flow @ Full Bridge} + \text{Flow above bridge}$

$$Q = 3285 + \frac{1.486}{0.045} \left[(600 \times 0.4)^{2/3} \left(\frac{240}{600} \right) \right] (0.0081)^{1/2}$$

$$Q = 3672$$

STORAGE :

$$S = 216.5 + \frac{(10.4 - 9.6)(600)(2400)}{43560}$$

$$S = \underline{\underline{395 \text{ AC-FT}}}$$

PROJECT WASHINGTON ST. BRIDGE - SECTION JUST UPSTREAM OF BRIDGE - SECTION (2)	COMP BY ETB	JOB NO. 20583 05
	CHK BY JW	DATE 8-17-78

ELEV.	FLOW CFS	STORAGE AC-FT
98.1	3285	216.5
104	3672	3950
105	6410	4280
107	12105	4960
110	33305	6070

PROJECT	DOWNSTREAM DAM FAILURE HYDROGRAPHS	COMP BY	JOB NO.
		ETB	20563 05
		CHK BY	DATE
		MLL	8-16-78

X-SECTION ② @ WASHINGTON ST BRIDGE

$$Q_{p2} = 10,657 \text{ CFS}$$

$$\text{STAGE @ X-SECTION ②} = 106.4$$

INV. OF X-SECT

@ 83.6

$$V_1 = 476 \text{ AC-FT}$$

$$Q_{p3}(\text{TRIAL}) = Q_{p2} \left(1 - \frac{V_1}{S}\right)$$

$$Q_{p3}(\text{TRIAL}) = 10,657 \left(1 - \frac{476}{970}\right) = \underline{5427 \text{ CFS}}$$

$$\text{STAGE} = 104.64'$$

$$V_2 = 416 \text{ AC-FT}$$

$$V(\text{AVE.}) = \underline{446 \text{ AC-FT}}$$

$$Q_{p3} = Q_{p2} \left(1 - \frac{V_{\text{AVE}}}{S}\right)$$

$$Q_{p3} = 10,657 \left(1 - \frac{446}{970}\right)$$

$$Q_{p3} = 5757 \text{ CFS}, \text{ Elev.} = 104.76$$

$$H = 21.16'$$

PROJECT	DOWNSTREAM DAM FAILURE HYDROGRAPHS	COMP BY	JOB NO.
		DTB	20583 05
		CHK BY	DATE
		HL	8-17-78

$$\frac{1}{2} Q_{P3} T_3 = 12.1 S$$

$$T_3 = \frac{12.1 (974)}{\frac{1}{2} (575.7)} = \underline{\underline{4.08 \text{ hours}}}$$

PROJECT	COMP BY	JOB NO.
	CHK BY	DATE
	ETB	20513 05
	ME	8-24-75

Flow passed without overtopping
emergency spillway:

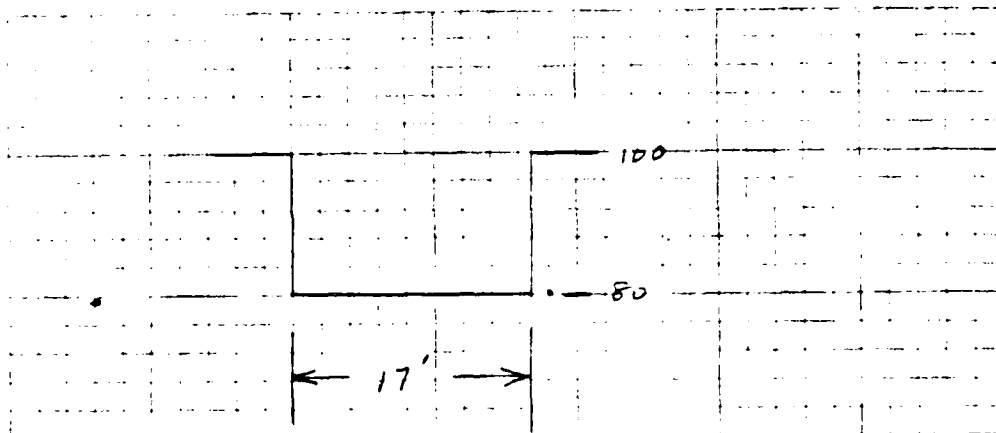
$$\text{For } S = 0.01$$

$$\text{Area} = 17 (17.6 - 80) = 1299.2 \text{ ft}^2$$

$$Q = \frac{1.486}{0.025} (299.2) \left(\frac{299.2}{17 + 2(17.6)} \right)^{2/3} (0.01)^{1/2}$$

$$Q = \underline{\underline{5699 \text{ CFS}}}$$

PROJECT	Flow through Generator Room - (if Section were open for flow)	COMP BY	JOB NO.
		171	20513 15
		CHK BY	DATE
		171	8-4-78



$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$n = 0.025 \text{ (Conc.)}$$

$$\text{For } S = 0.01 \text{ (Avg. River bottom slope):}$$

$$Q = \frac{1.486}{0.025} (17(20)) \left(\frac{17(20)}{57} \right)^{2/3} (0.01)^{1/2}$$

$$Q = \underline{\underline{6,650 \text{ cfs}}} \text{ (Full Section)}$$

$$\text{For } S = 0.05:$$

$$Q = \underline{\underline{14,870 \text{ cfs}}}$$

APPENDIX E
DAM INVENTORY FORMS

END

FILMED

7-85

DTIC